

LAW OFFICES
SUGHRUE, MION, ZINN, MACPEAK & SEAS, PLLC
2100 PENNSYLVANIA AVENUE, N.W.
WASHINGTON, DC 20037-3213
TELEPHONE (202) 293-7060
FACSIMILE (202) 293-7860
www.sughrue.com

September 29, 2000

BOX PATENT APPLICATION

Assistant Commissioner for Patents
Washington, D.C. 20231

Re: Application of Fumiyoshi ONO
COMPOSITION FOR POLISHING METAL ON SEMICONDUCTOR WAFER
AND METHOD OF USING SAME
Our Ref: Q61045
Divisional of Application No.: 09/313,356

Dear Sir:

This is a request for a Divisional Application of pending prior Application No. 09/313,356 filed May 18, 1999 of Fumiyoshi ONO entitled COMPOSITION FOR POLISHING METAL ON SEMICONDUCTOR WAFER AND METHOD OF USING SAME.

This application is being filed under 37 C.F.R. § 1.53(b). Enclosed is a specification, including the claims, and a copy of the Declaration as filed in the prior application. Also enclosed is an Information Disclosure Statement, a PTO Form 1449 listing references cited by applicant and/or the examiner during prosecution of the parent application.

The prior application is assigned to Group Art Unit 1765.

Priority is claimed from May 19, 1998, and April 22, 1999, based on JP Application Nos. 10-136934, and 11-115158, respectively. The priority documents were filed in parent Application No. 09/313,356.

Benefit is claimed from Provisional Applications 60/102,000 and 60/132,426 filed September 28, 1998 and May 4, 1999, respectively.

Amend the specification by inserting before the first line the sentence:

--Cross Reference to Related Applications

This is a Divisional of Application No. 09/313,356 filed May 18, 1999, the disclosure of which is incorporated herein by reference. This application is an application filed under 35 U.S.C. § 111(a) claiming benefit pursuant to 35 U.S.C. § 119 (e)(1) of the filing date of the Provisional Applications 60/102,000, filed September 28, 1998 and 60/132,426, filed May 4, 1999, pursuant to 35 U.S.C. § 111(b).--

Please **cancel** claims 1-5 without prejudice and or disclaimer.

DIVISIONAL APPLICATION

Divisional of Application No.: 09/313,356

The Government filing fee is calculated as follows:

Total claims	<u>4</u> - 20	=	<u> </u>	x	\$18.00	=	<u> </u>	\$0.00
Independent claims	<u>1</u> - 3	=	<u> </u>	x	\$78.00	=	<u> </u>	\$0.00
Base Fee								\$690.00

TOTAL FILING FEE

\$690.00

A check for the statutory fee of \$690.00 is attached. You are also directed and authorized to charge or credit any difference or overpayment to Deposit Account No. 19-4880. The Commissioner is hereby authorized to charge any fees under 37 C.F.R. §§ 1.16 and 1.17 and any petitions for extension of time under 37 C.F.R. § 1.136 which may be required during the entire pendency of the application to Deposit Account No. 19-4880. A duplicate copy of this transmittal letter is attached.

The application is timely filed.

Respectfully submitted,
SUGHRUE, MION, ZINN,
MACPEAK & SEAS, PLLC
Attorneys for Applicant

By: Waddell A. Biggart / Bruce S. Kerner
Waddell A. Biggart Reg. No. 33,725
Registration No. 24,861

006250" 9/22/09

COMPOSITION FOR POLISHING METAL ON SEMICONDUCTOR WAFER
AND METHOD OF USING SAME

5 BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a polishing composition for selectively polishing a metal film on a semiconductor wafer and a polishing method of using the composition.

10 2. Description of the Related Art

A typical semiconductor wafer comprises a substrate such as a silicon or gallium arsenide wafer, and a plurality of integrated circuits are formed on the substrate. The integrated circuits are chemically or physically integrated on the substrate by patterning the regions in the substrate and layers on the substrate. The layers are generally formed of a material having any one of a conductivity, an insulating property and a semiconducting property. In order to obtain semiconductor devices at a high yield, it is very important to start from a flat semiconductor wafer. To this purpose, the surface or a certain part of the semiconductor wafer must be often polished.

25 According to the surface formation by conventional techniques, the upper surface of the wafer is disadvantageously left to have a topography still in a very irregular state such that upheavals, uneven height regions, troughs, trenches and other similar surface irregularities are present. Therefore, the surface must be planalized overall so as to ensure a sufficiently large depth of focus in photolithography and to remove the irregularity and surface defects during various steps in the production process. For attaining flatness on the wafer surface, several polishing methods are known and a chemical/mechanical planalization or polishing (CMP) is used over a wide range in the treatment for rendering the

wafer surface flat during various steps in the production of a device, so that the yield, performance and reliability can be improved.

5 The slurry used for this chemical/mechanical polishing is formed from an acidic or basic solution containing abrasive grains such as silica, alumina, zirconia, ceria or titania.

10 The CMP technique is essential in the production process of a semiconductor device, particularly in the planalization of an interlayer insulating film for the formation of a multi-layer interconnection, in the formation of a conductive plug which is a metal, or in the formation of flush wiring.

15 With respect to the slurry for CMP used in the formation of a conductive plug which is a metal film comprising tungsten, aluminum, copper, titanium or an alloy thereof, JP-A-8-83780 (the term "JP-A" as used herein means an "unexamined published Japanese patent application (Kokai)") discloses an abrasive composition
20 containing a polishing accelerator such as an aminoacetic acid and/or amidosulfuric acid or an oxidizing agent, and a chemical reagent such as benzotriazole, and JP-A-8-197414 discloses a slurry containing a metal oxide particle such as fumed silica or fumed alumina having
25 specific properties.

30 Conventional slurries for polishing a metal film of a semiconductor device are disadvantageous in that both the polishing rate for a metal film and the ratio (selection ratio) of the polishing rate for a metal film to the polishing rate for an oxide film (insulating layer) such as silica cannot be increased or, even if the polishing rate is high, a large number of scratches are generated on the polished surface.

35 The object of the present invention is to provide a slurry composition for polishing a metal film on a semiconductor substrate, which ensures a high polishing rate for a metal film, a high selection ratio,

006260"092900

and reduction in the generation of scratches on the polished surface, as well as a method for polishing using the above composition.

SUMMARY OF THE INVENTION

5 As a result of extensive studies to achieve the above-described object, the present inventor has made the present invention.

10 More specifically, the present invention provides a slurry composition for polishing a metal film on a semiconductor substrate, comprising alumina-type fine particles containing or not containing alumina hydrate, a polishing accelerator and water, the alumina-type fine particles having an α conversion ratio of from 65 to 90% and a specific surface area of from 30 to 80 m²/g.

15 By the present invention, the polishing work can be favored with a high polishing rate for a metal film, particularly a high selection ratio, and reduction in scratches on the polished surface.

DETAILED DESCRIPTION OF THE INVENTION

20 The alumina-type fine particles containing or not containing an alumina hydrate for use in the present invention are described below.

25 The alumina-type fine particles can be produced by preparing an alumina sol, forming it into a gel while heating, subjecting the gel to calcination and then firing, and crushing the fired powder in a medium stirring-type grinding machine.

30 To speak more specifically, a sol-form aqueous solution of a commercially available pseudo boehmite is prepared in a concentration of from 2 to 60 wt% using an inorganic acid such as nitric acid, or an organic acid, or the like. The amount of peptizer added is preferably on the order of from 1×10^{-2} to 10^{-5} mol/g, and the pH of the solid is preferably on the order of from 3 to 4.

35 If the amount of the peptizer added is less than 1×10^{-5} mol/g, the peptization does not proceed

006260"9222960

006260" 9227960

satisfactorily and the fine particles after firing are deteriorated in their properties, whereas if the added amount is excessively large, the sol is abruptly gelled and the fired fine particles are also disadvantageously deteriorated in their properties.

The thus-prepared sol is dried to reduce the water content and is thereby formed into a dry gel. The gel obtained is calcined at from 500 to 800°C for about 1 hour and then preferably, crashed to have a grain size of about 1 mm or less.

After the calcination, the gel is fired at from 1,000 to 1,600°C, preferably at from 1,100 to 1,300°C, for from 1 to 3 hours. If the firing temperature is less than 1,000°C, the α -alumina conversion ratio is low and for elevating the ratio, a long period of time is necessary, whereas if it exceeds 1,600°C, the fired fine particles may be disadvantageously sintered.

After the firing, the fine particles are preferably wet-treated by crushing or cracking in an ordinary manner, such as pot milling, to have a maximum particle size of 100 μ m or less.

Thereafter, the fine particles are further pulverized by a medium stirring-type grinding machine such as an attritor, a bead mill, a Dynomill, an apex mill or a co-ball mill.

The conditions for the treatment in a medium stirring-type grinding machine are as follows.

- (1) Rotation number: from 1,000 to 2,000 rpm
- (2) Pulverization time: from 2 to 24 hours
- (3) Sample concentration: from 25 to 65 wt%
- (4) Sample amount: from 1 to 50 times the mill capacity
- (5) Grinding medium:
 - (a) sintered zirconia, alumina or silicon nitride ball
 - (b) ball size: from 0.5 to 3 mm ϕ

(c) ball amount: from 70 to 80% of the mill capacity.

The fine particles obtained by the above-described production process are a mixture of alumina and alumina hydroxide, more specifically, a mixture of α -alumina and an intermediate alumina showing a peak at $2\theta = 67.3^\circ$ at the measurement by X-ray diffraction (Cu and $K\alpha$ rays), or alumina-type fine particles containing bayerite in addition to those aluminas.

The alumina-type fine particles have the following properties.

When a peak height (a) at $2\theta = 68.2^\circ$ corresponding to α -alumina and a peak height (b) at $2\theta = 67.3^\circ$ corresponding to an intermediate alumina are determined by X-ray diffraction measurement with Cu and $K\alpha$ rays, the value according to the following expression, namely, the α conversion ratio is from 65 to 90%.

$$\alpha \text{ conversion ratio (\%)} = \frac{a}{a+b} \times 100$$

The alumina-type fine particles have a BET specific surface area of from 30 to 80 m^2/g .

The alumina-type fine particles preferably have a maximum grain size of 1.0 μm or less, more preferably 0.5 μm . If the maximum grain size exceeds 1.0 μm , scratches increase on the metal film or insulating film and furthermore, the above-described selection ratio disadvantageously decreases.

In order to have a maximum grain size of a predetermined value or less, coarse particles are preferably removed by decantation or the like.

The alumina-type fine particles preferably have an average size of from 0.05 to 0.5 μm , more preferably from 0.10 to 0.30 μm , the most preferably 0.15 to 0.30 μm .

If the average size is less than 0.05 μm , the mechanical polishing force decreases and the metal film

can be difficult to shave, whereas if it exceeds $0.5\ \mu\text{m}$, the polishing force increases but generation of scratches on the metal film or insulating film increases.

5 The concentration of the alumina-type fine particles in the polishing composition of the present invention is preferably from 0.5 to 20% by weight, more preferably from 1 to 10% by weight. If the concentration is less than 0.5% by weight, the polishing rate decreases. If the concentration exceeds 20% by weight, the polishing
10 rate does not increase and the selection ratio decreases. Particularly, a range of from 1 to 10% by weight is optimum from the viewpoints of the polishing rate and the selection ratio.

15 The α conversion ratio of the alumina-type fine particles of the present invention is optimum in a range of from 65 to 90%. If the α conversion ratio exceeds 90%, the scratches formed on the polished surface increase. If the α conversion ratio is less than 65%, the polishing rate decreases. Outside of the range is
20 not preferred.

The polishing accelerator for use in the present invention is described below. The polishing accelerator which can be used in the present invention is not particularly limited, however, $\text{Fe}(\text{NO}_3)_3$ type or H_2O_2 type
25 oxidizing agents, inorganic polishing accelerators such as ammonium cerium(IV) nitrate, ammonium cerium(IV), sulfate, cerium(IV) sulfate and cerium(IV) chloride, organic polishing accelerators such as organic acids having a molecular weight of 100 to 300 of carboxylic
30 acid, or the like are preferred.

When the inorganic polishing accelerator is used, the amount of the accelerator added is preferably from 2 to 7% by weight based on the polishing composition. If the added amount is less than 2 wt% high-speed polishing
35 becomes difficult, whereas if it exceeds 7 wt%, the effect due to increase in the added amount is not

increased and this is not preferred in view of
profitability. In the case of the organic polishing
accelerator, the amount of the polishing accelerator
added is preferably from 0.1 to 5% by weight based on the
polishing composition.

The slurry of the present invention may contain
various known additives commonly added to the polishing
slurry composition, such as a dispersant, a buffer, a
surface active agent and a viscosity controlling agent,
within the range of not impairing the preferred
properties of the slurry.

The polishing composition of the present invention
may be preferably used for polishing a metal film on a
semiconductor substrate. The metal film includes
tungsten, aluminum, copper, titanium, tantalum, etc., and
alloys of these metals. The polishing composition of the
present invention provides a high polishing rate of a
metal film. The polishing composition of the present
invention is particularly useful in selectively polishing
a metal film of a semiconductor substrate having a metal
film and an insulating film thereon. The insulating film
may be an oxidized silicon or nitrized silicon film. The
polishing composition of the present invention provides a
high selection ratio of polishing a metal film to
polishing an insulating layer, for example, above 200,
even above 400 for W/SiO₂, above 600 for Cu/SiO₂, and
above 800 for Co/SiO₂.

For example, when a metal film is formed on an
insulating layer as above, which in turn is formed on a
semiconductor substrate, since the polishing selection
ratio between a metal film and an insulating layer is
high in the polishing composition of the present
invention, the finish point of polishing a metal film can
be easily detected and controlled without excessive
polishing of the underlying insulating layer.

EXAMPLES

006269"9/2/95

The present invention is described in greater detail below by referring to the Examples, however, the present invention should not be construed as being limited to these Examples.

5 (Example 1)

A pseudo boehmite (puarl SB, produced by CONDEA) was formed into a 20 wt% water dispersion slurry and thereto a 65% diluted nitric acid was added in an amount of 0.0625 ml/g based on the solid content, to form a sol.

10 After the slurry was completely formed into a sol, the sol was transferred to a stainless steel vat and the vat was placed in a dryer kept at 120°C to form a dry gel. The dry gel was crushed by a pin mill to have a size of 1 mm or less and calcined at at 650°C for 1 hour.

15 The powder obtained was further fired at 1,200°C for 1 hour. The resulting fired powder had an α conversion ratio of 98% and a specific surface area of 7 m²/g.

This fired powder was wet grained in an ordinary pot mill to have a maximum particle size of 100 μ m or less.

20 Thereafter, the powder was pulverized for 8 hours in an apex mill (manufactured by Kotobuki Giken KK) having an inner volume of 1 L, containing 2.5 kg of 0.8-mm ϕ zirconia balls as the milling medium and rotating at 1,500 rpm, while circulating 1.8 kg of a slurry (slurry concentration: 33 wt%) consisting of 600g of alumina and 25 1,200g of water (circulation amount: 1 kg/min, amount of slurry residing in the grinder: 200g).

The alumina-type fine particles obtained had an α conversion ratio of 87% and a specific surface area of 30 63 m²/g. It was confirmed by X-ray diffraction with Cu and K α rays that peaks are present at $2\theta = 68.2^\circ$ (corresponding to α -alumina) and $2\theta = 67.3^\circ$ (corresponding to intermediate alumina) and also confirmed by the absorption peak with FT-IR that bayerite 35 was contained. The fine particles had an average

006260-092960

particle size of 0.22 μm measured by the dynamic light scattering method (MICROTRAC UPA).

Then, an aqueous slurry containing, in terms of the slurry concentration, 2 wt% of the alumina-type fine particles obtained above and 3.5 wt% of iron nitrate enneahydrate (guaranteed reagent, produced by Kanto Kagaku KK) as the polishing accelerator was prepared and evaluated on the polishing properties under the following conditions. The results obtained are shown in Table 1.

Polishing Conditions

Work: obtained by adhering 5 sheets of pellets made of tungsten (purity: 99.9 wt%) each having a size of 20 mm ϕ and 5 mm thickness on a glass-made substrate of 110 mm ϕ and 5 mm thickness

Pad: two layer-type pad for polishing semiconductor device (Rodel Nitta KK, IC1000/Suba400)

Polishing machine: single side polishing machine (Model 7941-338, manufactured by Marumoto Kogyo KK, table diameter: 320 mm)

Revolution number of table: 60 rpm

Work pressure: 400 gf/cm²

Slurry feeding rate: 10 ml/min

Polishing time: 15 minutes

Evaluation Item

Polishing rate:

The change in the weight of the work before and after the polishing was measured and the polishing rate was calculated therefrom in terms of thickness.

In order to evaluate the selection ratio of the polishing of the tungsten to the insulating film, the same slurry was examined on the polishing performance for

a commercially available thermally oxidized film formed on a silicon substrate by the following method.

Polishing Conditions

5 Work: obtained by forming thermally oxidized
 film (thickness: about 1 μm) on a silicon
 wafer of 6 inches ϕ and 625 μm in
 thickness (commercially available product)
 Pad: two layer-type pad for polishing
 semiconductor device (the same as above)
10 Polishing machine:
 single side polishing machine for
 polishing semiconductor device, Model
 SH-24, manufactured by Speedfam KK, table
 diameter: 320 mm
15 Revolution number of table: 30 rpm
 Work pressure: 400 gf/cm²
 Slurry feeding rate: 100 ml/min
 Polishing time: 1 minute

Evaluation Item

20 Polishing rate:
 measured by a light interference-type film
 thickness measuring apparatus
 Evaluation of scratches:
 The number of scratches per 10 visual
25 fields was measured by the observation
 ($\times 50$) through a differential interference
 microscope and evaluated into the
 following 5 grades:
 1: good (from 0 to 1 scratch),
30 2: slightly good (from 2 to 9 scratches),
 3: normal (from 10 to 49 scratches),
 4: slightly many (from 50 to
 99 scratches),
 5: many (100 or more scratches).

006260" 9/22/95

As a result of evaluation using the above-described polishing method and conditions, the polishing rate for tungsten was found to be a value as large as 4,800 Å/min.

The polishing rate for the thermally oxidized film was a very low value of 8 Å/min. Accordingly, the polishing selection ratio of the tungsten to the insulating film was 600. The level in the evaluation of scratches was 2.

(Example 2)

A slurry was prepared using the same operation and conditions as in Example 1 except that the pulverization time in an apex mill was 4 hours, and evaluated on the polishing performance in the same manner as in Example 1. The results obtained are shown in Table 1.

In the alumina-type fine particle prepared in Example 2, bayerite was not detected by FT-IR. The alumina fine particles had an average particle size of 0.25 μm.

(Example 3)

A slurry was prepared using the same operation and conditions as in Example 1 except for changing the firing temperature from 1,200°C to 1,125°C, and was evaluated on the polishing performance in the same manner as in Example 1. The results obtained are shown in Table 1.

In the alumina-type fine particle prepared in Example 3 bayerite was detected. The fine particles had an average particle size of 0.19 μm.

(Example 4)

A slurry was prepared using the same operation and conditions as in Example 1 except for changing the firing temperature from 1,200°C to 1,100°C and the pulverization time in an apex mill from 8 hours to 4 hours, and evaluated on the polishing performance in the same manner as in Example 1. The results obtained are shown in Table 1.

In the alumina-type fine particles prepared in Example 4, bayerite was detected. The fine particles had an average particle size of 0.20 μm .

(Examples 5 to 7)

5 Slurries were prepared using the same alumina-type fine particles as in Example 1 by varying the polishing accelerator. The kind of the polishing accelerator and the slurry concentration at the polishing are shown in Table 1. The slurries were evaluated on the polishing
10 performance in the same manner as in Example 1. The results obtained are shown in Table 1.

(Example 8)

15 A slurry was obtained by the same operation as in Example 1 and evaluated on the polishing performance in the same manner as in Example 1 except for using aluminum (purity: 99.99%) in place of tungsten as the metal pellet. The results obtained are shown in Table 1.

(Example 9)

20 A slurry was evaluated on the polishing performance in the same manner as in Example 8 except for using copper (purity: 99.95%) in place of tungsten as the metal pellet. Other conditions were the same as in Example 1. The results obtained are shown in Table 1.

(Comparative Example 1)

25 Iron nitrate enneahydrate as the polishing accelerator was added to a slurry WA-400 produced by Cabot Corporation (specific surface area of the solid content contained in slurry: 50 m^2/g , crystal structure: intermediate alumina: grain size d_{50} : 0.15 μm) to have
30 a slurry concentration at the polishing shown in Table 1 and evaluated on the polishing performance in the same manner as in Example 1. The results obtained are shown in Table 1.

0065260" 9422969

Table 1

Example No., Comparative Example No.	Properties of Alumina-Type Fine Particle		Polishing Accelerator		Kind of Metal Polished	Polishing Rate (Å/min)		Selection Ratio	Evaluation of Scratch
	α Conversion Ratio (%)	Specific Surface Area (m ² /g)	Kind	Concentration at the Evaluation of Polishing		Metal	Thermal Oxide Film		
Example 1	87	62	iron nitrate ennehydrate	3.5 wt%	tungsten	4800	8	600	2
Example 2	90	31	iron nitrate ennehydrate	3.5 wt%	tungsten	5400	12	450	3
Example 3	68	63	iron nitrate ennehydrate	3.5 wt%	tungsten	3900	7	560	1
Example 4	68	77	iron nitrate ennehydrate	3.5 wt%	tungsten	4400	9	490	2
Example 5	87	62	ammonium cerium (IV) nitrate	5.0 wt%	tungsten	5000	20	250	3
Example 6	87	62	ammonium cerium (IV) sulfate	5.0 wt%	tungsten	2800	15	190	2
Example 7	87	62	cerium (IV) sulfate	5.0 wt%	tungsten	2600	6	430	2
Example 8	87	62	iron nitrate ennehydrate	3.5 wt%	aluminum	6000	8	750	3
Example 9	87	62	iron nitrate ennehydrate	3.5 wt%	copper	7500	8	940	2
Comparative Example 1	3% or less	50	iron nitrate ennehydrate	3.5 wt%	tungsten	4000	45	90	5

5

CLAIMS

1. A polishing composition for polishing a metal film on a semiconductor substrate, comprising alumina-type fine particles containing or not containing alumina hydrate, a polishing accelerator and water, said alumina-type fine particles having an α conversion ratio of from 65 to 90% and a specific surface area of from 30 to 80 m²/g.

2. The polishing composition for polishing a metal film on a semiconductor substrate according to claim 1, wherein said alumina-type fine particles have an average particle size of from 0.05 to 0.5 μ m.

3. The polishing composition for polishing a metal film on a semiconductor substrate according to claim 1, wherein said alumina-type fine particles are contained in a concentration of from 0.5 to 20% by weight of the slurry.

4. The polishing composition for polishing a metal film on a semiconductor substrate according to claim 1, wherein said polishing accelerator is an inorganic polishing accelerator and is contained in a concentration of 2 to 7% by weight of the slurry.

5. The polishing composition for polishing a metal film on a semiconductor substrate according to claim 1, wherein said polishing acceralator is an organic polishing accelerator and is contained in a concentration of 0.1 to 5% by weight.

6. A method for polishing a metal film on a semiconductor substrate, comprising the steps of:
providing a semiconductor substrate comprising a metal film and an insulating film therein;
providing a polishing composition comprising alumina-type fine particles containing or not containing aluminum hydrate, a polishing accelerator and water, said alumina-type fine particles having an α conversion ratio of from 65 to 90% and a specific surface

006660"9229500

area of from 30 to 80 m²/g, and

mechanochemically polishing a metal film
on said semiconductor substrate with said polishing
composition.

5 7. The method according to claim 6, wherein said
metal of said metal film is selected from the group
consisting of tungsten, aluminum, copper, titanium,
tantalum, and alloys thereof.

10 8. The method according to claim 6, wherein said
insulating layer is made of a material selected from
oxidized silicon and nitrided silicon.

15 9. The method according to claim 6, wherein said
metal film is of tungsten, said insulating layer is of
oxidized silicon, and a selection ratio of polishing
between said tungsten and oxidized silicon is above 200.

006250" 9422960

COMPOSITION FOR POLISHING METAL ON SEMICONDUCTOR WAFER
AND METHOD OF USING SAME

5

ABSTRACT OF THE DISCLOSURE

10 A slurry for polishing a metal film of a
semiconductor device, comprising alumina-type fine
particles having specific properties and composition, a
polishing accelerator and water.

005260" 9422960

Declaration and Power of Attorney for Patent Application

特許出願宣言書及び委任状

Japanese Language Declaration

日本語宣言書

下記の氏名の発明者として、私は以下の通り宣言します。

As a below named inventor, I hereby declare that:

私の住所、私書箱、国籍は下記の私の氏名の後に記載された通りです。

My residence, post office address and citizenship are as stated next to my name,

下記の名称の発明に関して請求範囲に記載され、特許出願している発明内容について、私が最初かつ唯一の発明者(下記の氏名が一つの場合)もしくは最初かつ共同発明者であると(下記の名称が複数の場合)信じています。

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

COMPOSITION FOR POLISHING METAL ON SEMICONDUCT

WAFER AND METHOD OF USING SAME

上記発明の明細書(下記の欄でX印がついていない場合は、本書に添付)は、

the specification of which is attached hereto unless the following box is checked:

☐ ____月 ____日に提出され、米国出願番号または特許協定条約

☒ was filed on May 18, 1999
as United States Application Number or
PCT International Application Number

国際出願番号を ____ とし、

(該当する場合) ____ に訂正されました。

____ and was amended on

____ (if applicable).

私は、特許請求範囲を含む上記訂正後の明細書を検討し、内容を理解していることをここに表明します。

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

私は、連邦規則法典第37編第1条56項に定義されるとおり、特許資格の有無について重要な情報を開示する義務があることを認めます。

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

Japanese Language Declaration

(日本語宣言書)

私は、米国法典第35編第119条(a)-(d)項又は第365条(b)項に基づき下記の、米国以外の国の少なくとも一カ国を指定している特許協力条約第365条(a)項に基づく国際出願、又は外国での特許出願もしくは発明者証の出願についての外国優先権をここに主張するとともに、優先権を主張している本出願の前に出願された特許または発明者証の外国出願を以下に、枠内をマークすることで、示しています。

Prior Foreign Applications

外国での先行出願

10-136934(Pat.Appln.)	Japan
(Number) (番号)	(Country) (国名)
11-115158(Pat.Appln.)	Japan
(Number) (番号)	(Country) (国名)
(Number) (番号)	(Country) (国名)

私は、第35編米国法典119条(e)項に基づいて下記の米国特許出願規定に記載された権利をここに主張致します。

(Application No.) (出願番号)	(Filing Date) (出願日)
-----------------------------	------------------------

私は、下記の米国法典第35編第120条に基づいて下記の米国特許出願に記載された権利、又は米国を指定している特許協力条約第365条(c)に基づく権利をここに主張します。又、本出願の各請求範囲の内容が米国法典第35編第112条第1項又は特許協力条約で規定された方法で先行する米国特許出願に開示されていない限り、その先行米国出願書提出日以降で本出願書の日本国内又は特許協力条約国際出願提出日までの期間中に入手された、連邦規則法典第37編第1条第56項で定義された特許資格の有無に関する重要な情報について開示義務があることを認識しています。

(Application No.) (出願番号)	(Filing Date) (出願日)
-----------------------------	------------------------

(Application No.) (出願番号)	(Filing Date) (出願日)
-----------------------------	------------------------

私は、私自身の知識に基づいて本宣言中で私が行う表明が真実であり、かつ私の入手した情報と私の信ずるところに基づく表明が全て真実であると信じていること、さらに故意になされた虚偽の表明及びそれと同等の行為は米国法典第18編第1001条に基づき、罰金または拘禁、もしくはその両方により処罰されること、そしてそのような故意による虚偽の声明を行えば、出願した、又は既に許可された特許の有効性が失われることを認識し、よってここに上記のごとく宣誓を致します。

I hereby claim foreign priority under Title 35, United States Code, Section 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

19/May/1998
(Day/Month/Year Filed)
(出願年月日)

22/April/1999
(Day/Month/Year Filed)
(出願年月日)

(Day/Month/Year Filed)
(出願年月日)

Priority Not Claimed
優先権主張なし

☐
☐
☐

I hereby claim the benefit under Title 35, United States Code, Section 119(e) of any United States provisional application(s) listed below.

- 1) 60/102,000(Pat.Appln.) 28/September/1998
- 2) 60/132,426(Pat.Appln.) 4/May/1999

(Application No.) (出願番号)	(Filing Date) (出願日)
-----------------------------	------------------------

I hereby claim the benefit of Title 35, United States Code Section 120 of any United States application(s), or 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code Section 112, I acknowledge the duty to disclose any material information which is material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

(Status: Patented, Pending, Abandoned) (現況: 特許許可済、係属中、放棄済)

(Status: Patented, Pending, Abandoned) (現況: 特許許可済、係属中、放棄済)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Japanese Language Declaration

(日本語宣言書)

記の発明者として、本出願に関する一切の
商標局に対して遂行する弁理士又は代理
のを指名致します。(弁護士、又は代理人の
を明記のこと)

POWER OF ATTORNEY: As a named inventor, I hereby
appoint the following attorney(s) and/or agent(s) to
prosecute this application and transact all business in the
Patent and Trademark Office connected therewith (list
name and registration number)

Mion, Reg. No. 18,879; Thomas J. Macpeak, Reg. No. 19,292; Robert J. Seas, Jr., Reg. No. 21,092;
lexic, Reg. No. 23,063; Robert V. Sloan, Reg. No. 22,775; Peter D. Olexy, Reg. No. 24,513; J. Frank
eg. No. 24,625; Waddell A. Biggart, Reg. No. 24,861; Louis Gubinsky, Reg. No. 24,835; Neil B.
Reg. No. 25,200; David J. Cushing, Reg. No. 28,703; John R. Inge, Reg. No. 26,916; Joseph J. Ruch,
No. 26,577; Sheldon I. Landsman, Reg. No. 25,430; Richard C. Turner, Reg. No. 29,710; Howard L.
in, Reg. No. 25,665; Alan J. Kasper, Reg. No. 25,426; Kenneth J. Burchfiel, Reg. No. 31,333; Gordon
; No. 30,764; Susan J. Mack, Reg. No. 30,951; Frank L. Bernstein, Reg. No. 31,484; Mark Boland,
32,197; William H. Mandir, Reg. No. 32,156; Scott M. Daniels, Reg. No. 32,562; Brian W. Hannon,
32,778; Abraham J. Rosner, Reg. No. 33,276; Bruce E. Kramer, Reg. No. 33,725; Paul F. Neils, Reg.
102 and Brett S. Sylvester, Reg. No. 32,765

Send Correspondence to:

SUGHRUE, MION, ZINN, MACPEAK & SEAS, PLLC
2100 Pennsylvania Avenue, N.W., Washington, D.C. 20037-3202

先 (名称及び電話番号)

Direct Telephone Calls to: (name and telephone number)

(202)293-7060

発明者名	Full name of sole or first inventor Fumiyoshi Ono		
日付 野 文善 June 25, 1999	Inventor's signature		Date
Residence Shiojiri-shi, Nagano, Japan			
Citizenship Japanese			
Post office address c/o SHOWA DENKO K.K. SHIOJIRI WORKS, 1, Oaza Soga, Shiojiri-shi, Nagano 399-6461, Japan			
発明者名 (該当する場合)	Full name of second joint inventor, if any		
署名 日付	Second inventor's signature		Date
Residence			
Citizenship			
宛先	Post office address		

以降の共同発明者についても同様に記載し、署名をする (Supply similar information and signature for third and subsequent joint inventors.)